

AI-powered insights: Analysing visual and textual content on social media for destination marketing management

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Goal and objectives of the dissertation

Goal

The goal of this doctoral dissertation is twofold: first, to establish a new methodology that leverages the continuous generation of user-generated content on social media to analyse tourist destinations (objectives 1 to 4); and second, to understand how tourists construct and reveal their experiences at a destination based on their behaviour and interactions (objectives 5 to 12). This dual approach ensures that the research not only contributes a novel methodological framework but also applies it to gain deeper insights into the dynamics of tourist engagement and destination perception.

Objectives

This thesis aims to develop the following objectives (Figure 1):

- Objective 1: develop and apply the methodology and tool of web scraping for downloading big data of tourist data from social media platforms.
- Objective 2: develop and apply a methodology based on big data and artificial intelligence for extracting valuable information from large volumes of tourist data obtained from social media platforms, using specific methods such as machine learning, deep learning, and neural networks.
- Objective 3: analyse the ethical aspects related to the management of big data on tourist data and the implementation of artificial intelligence technologies to analyse tourist behaviour.
- Objective 4: review the literature on big data and artificial intelligence in tourism marketing, delving into user-generated content and its research to date.
- Objective 5: identify new opportunities and emerging research topics.
- Objective 6: evaluate the relevance of the company of others during the tourist experience in generating emotions and the narcissistic behaviour of people.
- Objective 7: evaluate the relevance of the activities carried out during the tourist experience in generating emotions.
- Objective 8: evaluate the influence of message characteristics on its dissemination and the generation of engagement in destination posts on social media.
- Objective 9: evaluate the influence of the characteristics of the sender on the dissemination and generation of engagement in destination posts on social media.
- Objective 10: analyse the effectiveness of the type of influencer based on the sentiment about the destination expressed in their posts on social media platforms.
- Objective 11: analyse the effectiveness of the type of influencer based on their territorial connection with the destination.
- Objective 12: develop practical and theoretical implications for better management of destination marketing through user-generated content extracted from social media platforms.

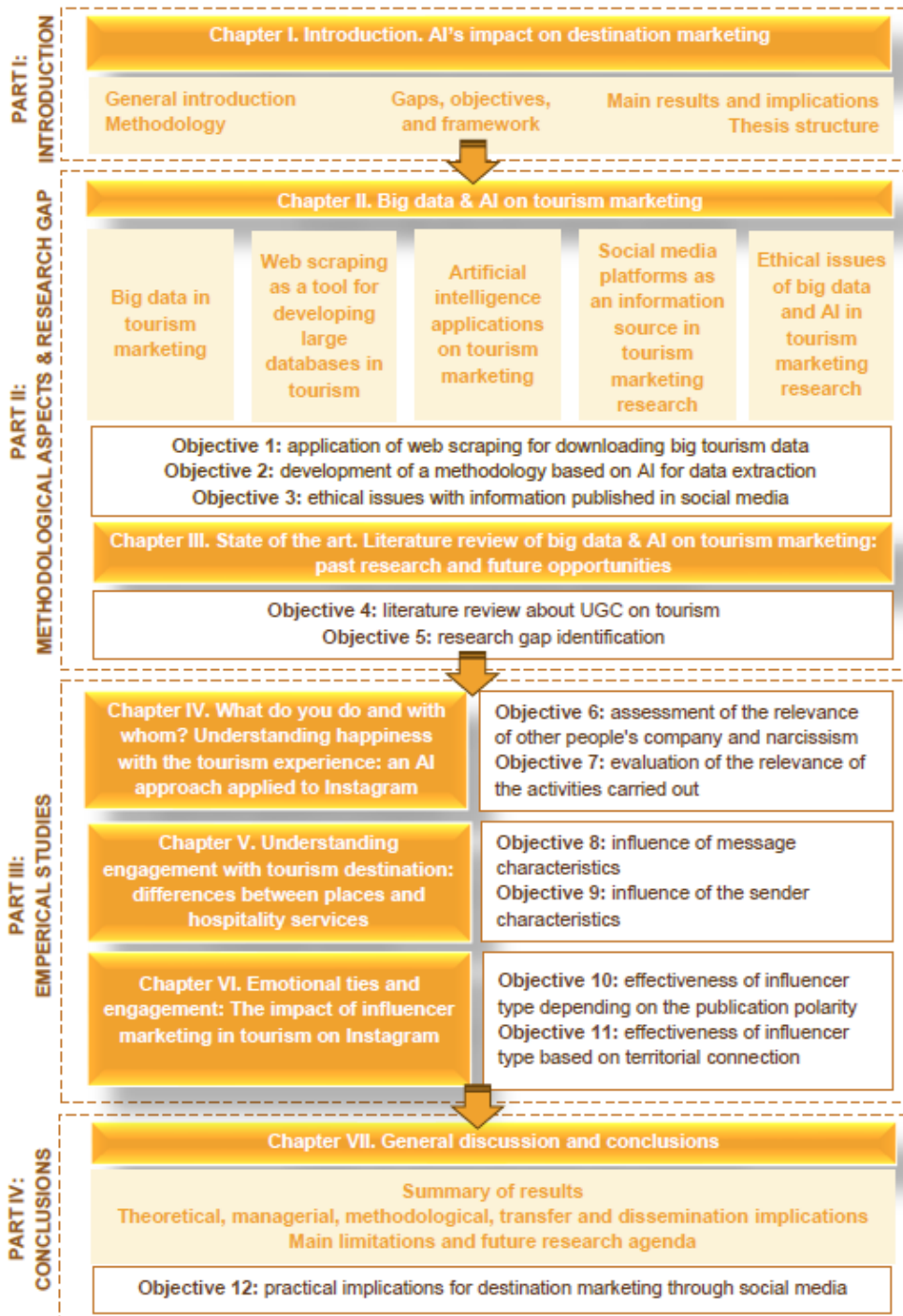


Figure 1. Structure and outline of the doctoral thesis

Methodology

This research follows a structured five-phase methodology designed to systematically analyse user-generated content from Instagram to provide actionable insights for destination marketing organisations (Figure 2). The first phase involved selecting Instagram as the primary platform for data collection, given its extensive use by travellers and its visually rich content. An inland, cultural and gastronomic destination was chosen as the case study. The chosen destination belongs to one of the routes of the Camino de Santiago de Compostela, a cultural asset added to the UNESCO World Heritage List in 1993. In the second phase, a custom web scraping technique was employed to collect approximately 140,000 posts (139,273 valid) related to the destination. This step ensured the accumulation of a vast dataset reflecting real-world tourist experiences. The third phase applied artificial intelligence (AI) techniques, including natural language processing for textual analysis and deep learning (neural networks) for image classification, to derive insights from the extracted data. In the fourth phase, user segmentation was conducted to classify contributors into tourists, residents, and businesses based on their posting behaviour. This classification helped identify patterns of engagement and the influence of different user groups on destination perception. Finally, the fifth phase involved predictive modelling, where key variables such as sentiment scores, content type, and engagement levels were extracted and analysed to develop models forecasting social media engagement. This methodological approach ensured a comprehensive understanding of tourist behaviour and engagement in social media platforms.

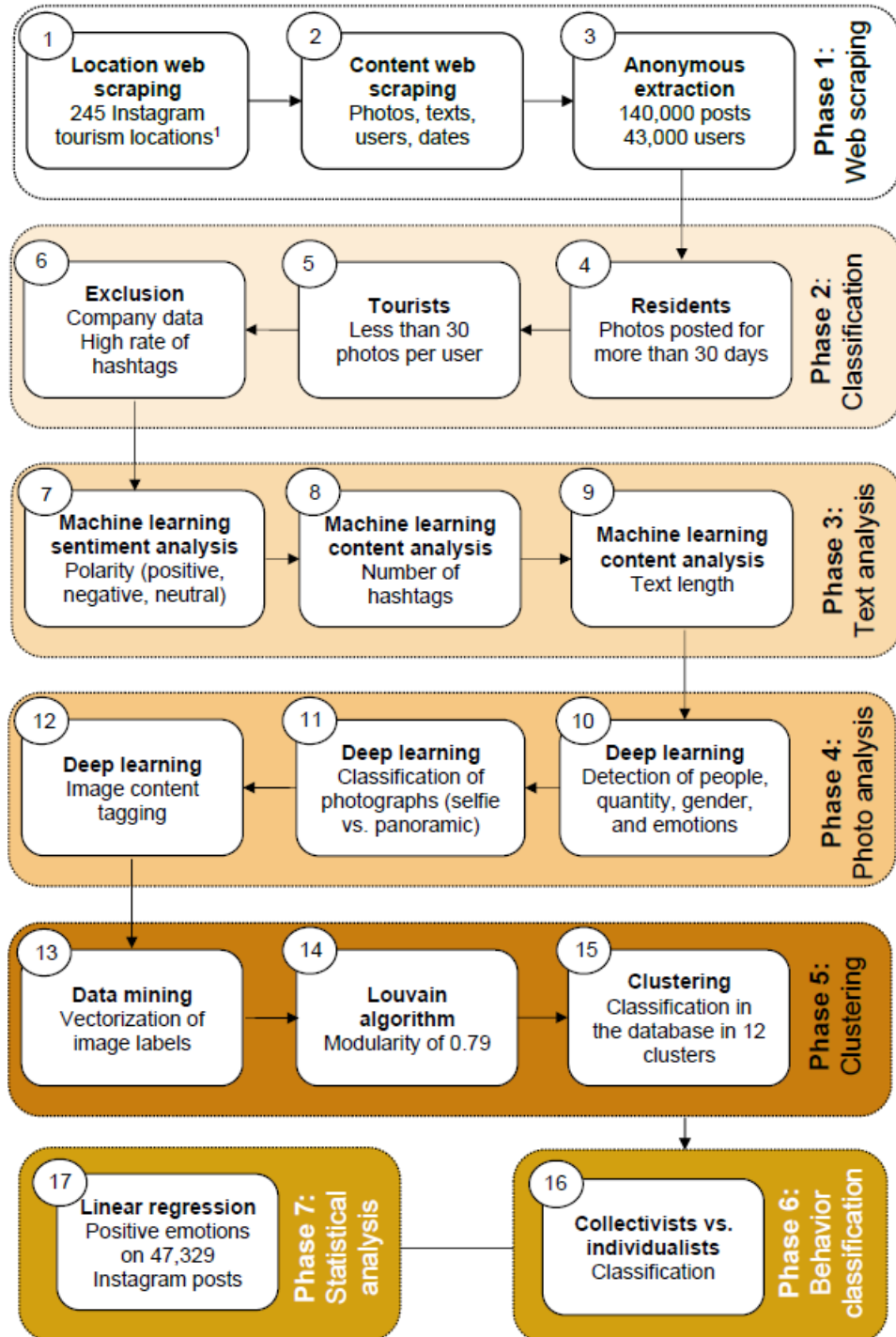


Figure 2. Example of methodology implementation

Results

The findings of this dissertation demonstrate the power of AI-driven analysis in uncovering patterns within user-generated content that may not be fully captured by traditional research methods. One of the most significant results is that positive emotions expressed in user-generated content substantially enhance the perceived image of the destination. Posts featuring visual content such as selfies and group photos displaying happiness consistently generated higher engagement levels.

The study also found that nano-influencers, despite having smaller followings, achieved higher engagement rates due to their closer and more authentic connections with their audience. Additionally, the research confirmed that social media engagement fluctuates based on the type of content shared, with emotion-laden posts garnering more interactions than neutral or purely informational content.

These findings highlight the necessity for destination marketing organisations to move beyond conventional marketing strategies and adopt AI-enhanced approaches that allow real-time monitoring and dynamic response to user engagement trends. The insights derived from this research provide a deeper understanding of tourist behaviour, enabling destination marketers to tailor their strategies to better align with audience preferences and digital interactions.

Theoretical conclusions

This dissertation contributes significantly to the theoretical discourse on artificial intelligence applications in tourism marketing (Figure 3). On this context, it validates and extends the Gartner model of destination image formation (Gartner, 1994) by demonstrating the role of user-generated content as a crucial component in shaping tourist perceptions. The study also integrates communication theory (Baker, 1976; Craig, 1999) to explore how digital messages, particularly those conveyed through visual and textual content, influence consumer engagement. Mental imagery theory (MacInnis & Price, 1987) further supports the analysis, emphasizing how tourists form emotional connections with destinations through social media content. The application of Granovetter's strength of weak ties theory (Granovetter, 1973) provides new insights into influencer marketing, illustrating how nano-influencers, despite weaker ties, can generate stronger engagement than traditional influencers. By bridging multiple theoretical frameworks, this research presents a novel AI-driven approach to studying digital engagement in destination marketing, thereby advancing the academic understanding of social media's role in shaping tourist behaviour and destination appeal.

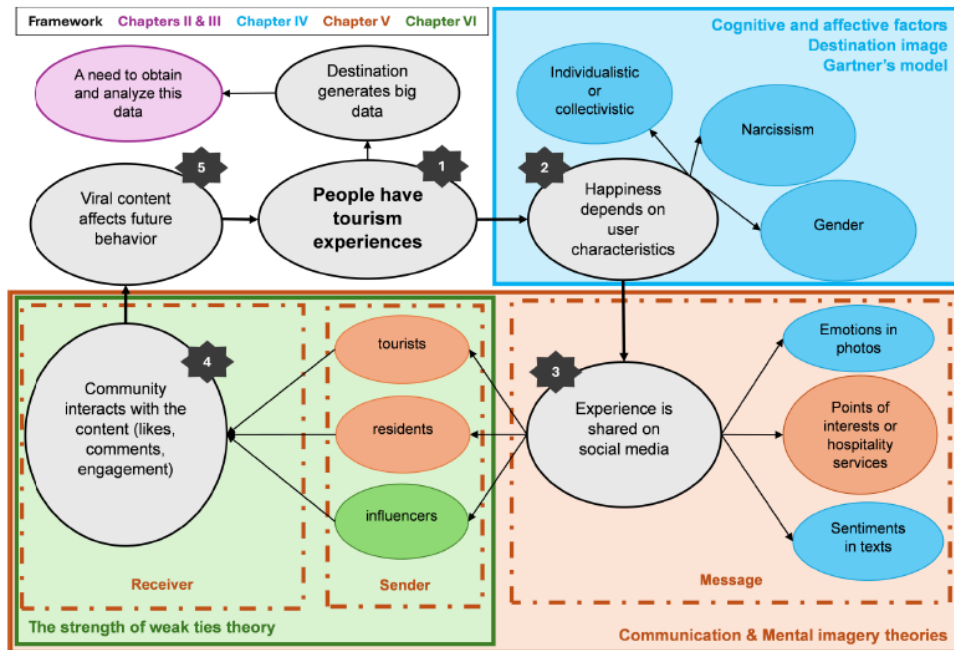


Figure 3. *Theoretical framework*

Practical application of the dissertation

The practical implications of this dissertation are extensive and directly applicable to destination marketing organisations seeking to enhance their digital marketing strategies. The findings emphasise the importance of leveraging user-generated content to create data-driven marketing campaigns that align with tourist preferences. Destination marketing organisations can optimise their strategies by encouraging and curating emotion-driven content that resonates with their target audiences. The insights also highlight the advantages of collaborating with nano-influencers, whose content fosters authentic engagement and improves destination perception. Additionally, the AI-driven framework developed in this research enables real-time monitoring of social media trends, allowing destination marketing organisations to swiftly adapt their strategies based on emerging patterns in tourist sentiment and engagement. Ethical considerations discussed in this dissertation provide guidelines for responsible artificial intelligence adoption in tourism marketing, ensuring transparency and compliance with data privacy regulations. By implementing these AI-based methodologies, destination marketing organisations can refine their marketing efforts, enhance audience engagement, and strengthen their competitive positioning in the digital tourism, thanks to the digital platform developed for disseminate the results (Figure 4).

To facilitate the transfer of research findings to real-world applications, this dissertation has resulted in the development of photo data tour analytics, an interactive digital platform designed to support destination managers, tourism businesses, and policymakers in analysing and visualising user generated content from social media. The platform serves as a decision-support tool, allowing users to monitor and interpret social media engagement related to tourism destinations. The photo data tour analytics platform offers an intuitive interface where users can explore interactive data visualization dashboards, helping them monitor tourist engagement and content trends over time. Through AI-driven sentiment analysis, the platform detects and categorises emotions expressed in tourist-generated content, providing deep insights into visitor satisfaction and the public perception of destinations. Additionally,

it integrates image classification technology, allowing the system to automatically categorise visual content into different themes, such as landscapes, gastronomy, cultural attractions, or personal experiences like selfies. This feature helps tourism professionals understand which types of images resonate most with visitors and contribute to destination branding.

Moreover, the platform incorporates an influencer impact analysis module, which helps identify key figures driving engagement within a destination's social media ecosystem. By distinguishing between nano-influencers and high-profile influencers, the tool provides valuable data on their effectiveness in influencing visitor behaviour and shaping a destination's image. Additionally, real-time trend monitoring allows tourism managers and marketers to quickly detect emerging patterns, track viral content, and adapt their promotional strategies accordingly. With this combination of features, photo data tour analytics empowers stakeholders to make data-driven decisions, refine marketing campaigns, and enhance engagement strategies in a rapidly evolving digital landscape.

Given its broad functionality, the platform is designed to serve a diverse audience of tourism stakeholders. Destination marketing organisations can use it to gain a deeper understanding of tourist perceptions and refine their marketing strategies accordingly. Similarly, tourism businesses, including hotels, restaurants, and attractions, can leverage the platform to analyse how their services are perceived online and optimise their promotional efforts based on user-generated content. Local governments and policymakers also stand to benefit from the tool, as it provides critical insights into the social and economic impact of tourism in specific locations, helping them develop more sustainable tourism policies. Finally, academics and researchers can utilise the platform as a resource for studying digital engagement trends, artificial intelligence applications in tourism, and the evolving role of user generated content in destination branding.

By making big data analytics and artificial intelligence more accessible, photo data tour analytics represents a practical extension of this dissertation, bridging the gap between academic research and industry application. Its ability to process, analyse, and present real-time tourism insights makes it an essential tool for those looking to understand and optimise the digital presence of tourist destinations.

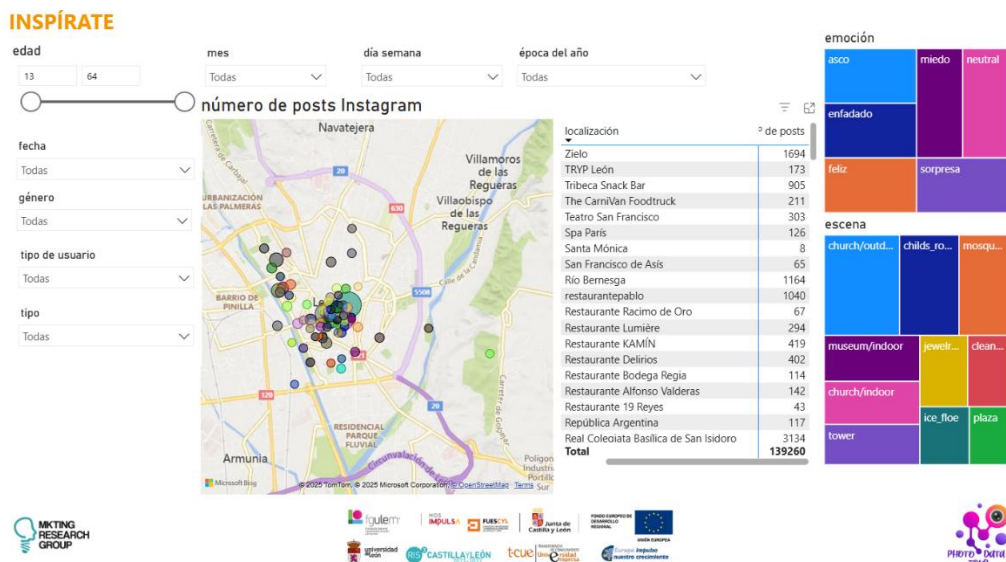


Figure 4. Photo Data Tour Analytics platform

Content of the dissertation

Abstract of chapter 1

This chapter outlines the research gaps in destination marketing and introduces the objectives of the dissertation. It highlights the importance of analysing user generated content with AI-driven methodologies to understand tourist behaviour and engagement. The chapter discusses the theoretical foundation of the study and the growing significance of digital transformation in the tourism industry. It establishes the conceptual framework for examining the interplay between social media data and marketing strategies. The chapter concludes by detailing the structure of the dissertation and the primary research questions that guide the study.

Abstract of chapter 2

The second chapter provides an overview of big data and artificial intelligence applications in tourism marketing. It explores the role of machine learning and deep learning in analysing large-scale digital content. The chapter delves into the ethical implications of using artificial intelligence for data extraction, focusing on privacy concerns and regulatory challenges. It also discusses the significance of web scraping as a methodological approach for collecting user-generated content from social media. This chapter sets the foundation for integrating AI-based analytics into destination marketing research.

Abstract of chapter 3

This chapter presents a comprehensive literature review on artificial intelligence and big data in tourism marketing. A bibliometric analysis is conducted to map the evolution of research in this field. The chapter identifies key trends, thematic areas, and research gaps related to AI-driven tourism analytics. By analysing past studies, the chapter establishes the importance of integrating artificial intelligence techniques in tourism marketing strategies. The findings from the literature review provide insights into the academic discourse on digital marketing and emerging research opportunities. The results show that AI-based methodologies have gained prominence in recent years, offering new opportunities for enhancing the efficiency and accuracy of destination marketing strategies (Blanco-Moreno et al., 2024a).

Abstract of chapter 4

The fourth chapter focuses on the empirical study of tourist experiences through user generated content analysis. It examines how tourists share their experiences via images, texts, and metadata on Instagram. AI-based techniques such as sentiment analysis and image classification are applied to extract valuable insights. The chapter demonstrates how digital content can reveal engagement patterns, preferences, and perceptions of a destination. The results highlight the relevance of visual and textual data in shaping destination marketing strategies. The study confirms that tourists' emotions and the type of visual content shared directly impact engagement rates and the perceived attractiveness of destinations (Blanco-Moreno et al., 2024b).

Abstract of chapter 5

Chapter five investigates the relationship between social media engagement and destination image. It explores how different content types influence user interactions and perceptions. The study identifies key factors that drive engagement, including emotional expressions, visual appeal, and influencer impact. By analysing large-scale Instagram data, the chapter uncovers insights into how destinations can enhance their branding and audience engagement. The findings offer practical recommendations for optimising digital marketing strategies. The results suggest that influencer-generated content, particularly from nano-influencers, has a stronger effect on audience engagement and destination image formation than traditional promotional campaigns (Blanco-Moreno et al., 2024c).

Abstract of chapter 6

This chapter examines the role of influencer marketing in tourism and its impact on engagement. It categorizes influencers based on audience size and examines their effectiveness in shaping destination perceptions. The findings reveal that nano-influencers generate higher engagement due to their authenticity and closer audience relationships. The chapter discusses how destination marketing organisations can leverage influencer collaborations to enhance destination marketing. Ethical considerations related to influencer transparency and promotional content are also explored.

Abstract of chapter 7

The final chapter provides a general discussion of the research findings and their implications. It synthesizes the key insights derived from the study and outlines recommendations for destination marketing organisations. The chapter also discusses the study's limitations and directions for future research. It emphasises the role of artificial intelligence in revolutionising digital tourism marketing and highlights areas for further investigation. The dissertation concludes with reflections on the impact of big data and artificial intelligence on the future of destination marketing strategies.

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